

In the Specification:

Please replace the paragraph beginning at page 1, line 16, with the following rewritten paragraph:

--Tunable micro electromechanical (MEMS) filters are playing an increasingly important role in modern optical communication networks. They are being deployed in applications ranging from systems that monitor the spectral characteristics of the optical signals that are transmitted through the networks to tuning elements for laser devices, for example. These applications are most important in modern wavelength division multiplex (WDM) systems in which many optical carrier signals are combined into a common fiber at different carrier wavelengths. Still further applications include matched-noise filtering at receivers, in add-drop devices, and tunable devices such as tunable lasers.--

Please replace the paragraph beginning at page 1, line 24, with the following rewritten paragraph:

--One common tunable filter configuration uses two nominally parallel mirrors, in which at least one of the mirrors is translated relative to the other mirror to achieve the tuning function. Such tunable filters are often referred to as tunable Fabry-Perot filters. Typically, at least one of the two mirrors is curved to ease assembly tolerances.--

Please replace the paragraph beginning at page 1, line 28, with the following rewritten paragraph:

-- Some conventional systems integrate the tunable filter into the larger optical system by simply locating it between two fiber pigtails; one fiber pigtail emits the optical signal to be filtered and the other fiber pigtail collects the filtered optical signal after its transmission through the tunable filter. The tunable filter is oriented to be orthogonal to the axis extending between the fiber endfaces.--

Please replace the paragraph beginning at page 2, line 4, with the following rewritten paragraph:

--As optical systems are developed that allow for higher levels of functionality in a single package, the alignment of the tunable filter elements in the optical systems becomes less trivial. This is especially true in systems utilizing free-space interconnects between the tunable filters and other optical components in the system.--

Please replace the paragraph beginning at page 4, line 22, with the following rewritten paragraph:

-- In the current implementation, the lenses 114, 116 are constructed according to the mass transport technique described in U.S. Pat. No. 5,618,474, the teachings of which are incorporated herein by this reference in their entirety. The diameter of the lenses is between 100 and 500 microns. Typically the diameters are between 150 and 300 microns. The invention, however, is compatible with other types of microlenses such as those generated by diffractive, binary optics, gradient index processes, or refractive element replication, for example. In the preferred embodiment, the filter is a MEMS device as described in Patent Application Serial No. 09/649,168, filed on August 25, 2000, by Flanders, *et al.*, entitled Tunable Fabry-Perot Filter, this application is incorporated herein by this reference.--

Please replace the paragraph beginning at page 6, line 12, with the following rewritten paragraph:

-- In the preferred embodiment, the positions of the fiber and the lens are manipulated in two dimensions in a plane that is orthogonal to the optical axis by the manipulation system. Specifically, their positions are manipulated in the y-axis direction illustrated by arrows 150 and 152, but also in the x-axis direction, which extends into the page in the illustration of Fig. 3.--

Please replace the paragraph beginning at page 7, line 4, with the following rewritten paragraph:

-- Fig. 6 is a flow diagram summarizing the above-described alignment process and optical component manipulation by the manipulation system. Specifically, in step

210, the mirror 138 is inserted into the optical train of the optical system 100 between lens #1 114 and lens #2 116. In step 212, the fiber 110 and lens #1 114 are aligned to maximize backward coupling efficiency. Then, the mirror 138 is removed in step 214. Finally, in steps 216 and 218, lens #2, and also possibly the filter 120, is translated while exciting the system with off-resonant light to again maximize the back-reflection, now from the filter 120.--

Please replace the paragraph beginning at page 7, line 25, with the following rewritten paragraph:

-- Fig. 8 illustrates an alignment process for an optical system as illustrated in Fig. 1 according to another embodiment of the present invention. In this embodiment, a camera, such as a CCD array, is inserted into the train of the optical system 100 at the position of fiber 110. In one implementation, the camera is inserted such that it is axial with the intended position of the fiber's endface 112. Thus, in the typical implementation, the camera is inserted into the optical train of the optical system prior to the installation of the fiber 110. This configuration is illustrated in Fig. 9.--

Please replace the paragraph beginning at page 8, line 5, with the following rewritten paragraph:

--With the camera inserted as described in step 250, the optical train is excited with an optical signal, which is preferably a single frequency such as generated by a distributed feedback laser, for example. This alignment signal is preferably launched in a direction reverse to the direction of optical signal propagation during normal operation of the optical system. The wavelength of the laser and the tunable filter are mutually adjusted so that the laser emission overlaps with the lowest order mode (TEM_{00}).--

Please replace the paragraph beginning at page 8, line 11, with the following rewritten paragraph:

--While excited, the surface of lens #2 116 is imaged onto the camera in step 254. Lens #2 116 is then translated with the manipulation system such that the lens image is

coincident with the nominal optical axis 130. This translation occurs in a plane that is orthogonal to the nominal optical axis or the x, y plane defined in Fig. 1.--

Please replace the paragraph beginning at page 8, line 15, with the following rewritten paragraph:

--With lens #2 116 aligned, the image of the surface of lens #1 is then imaged onto the camera in step 256. Lens #1 114 is then translated by the manipulation system in the x, y plane in step 258 so that it is similarly coincident and aligned relative to the optical axis 130. Specifically, the center of lens 114 is aligned such that it coincides with the nominal optical axis 130.--

Please replace the paragraph beginning at page 8, line 20, with the following rewritten paragraph:

-- In step 260, the camera is removed and the fiber is attached to the optical system in step 262, typically as part of a final manufacturing step of the optical system 100. Then, the optical system is excited with a broadband source in step 264. Specifically, the optical signal generator 130 is selected to be a broadband source such as a super luminescent light emitting diode SLED. With the optical system excited, the ratio between the lowest order mode and any higher order mode is then maximized in step 266. In the typical implementation, the ratio of the lowest order mode in the next higher order mode is maximized in step 266 by positioning the fiber 110 in the x, y plane.--

Please replace the paragraph beginning at page 9, line 1, with the following rewritten paragraph:

-- Fig. 10 shows the optical train of the optical channel monitoring system utilizing the optical filter train discussed with reference to Figs. 1-9.--

Please replace the paragraph beginning at page 9, line 3, with the following rewritten paragraph:

-- The fiber 110 terminates above an optical bench 135. During normal operation, the optical signal 14 is emitted out of the typically cleaved or cleaved-polished end-face of the fiber.-

Please replace the paragraph beginning at page 9, line 24, with the following rewritten paragraph:

-- A fold mirror 145 redirects the reference signal to the WDM filter 140. It should be noted, however, that this mirror is not required, but is simply used to facilitate integration of the system on a compact bench.--

Please replace the paragraph beginning at page 11, line 1, with the following rewritten paragraph:

-- In alternative embodiments, other LED sources are used, such as LED sources operating at approximately 1400 nm, such as an InGaAsP SLED.--

Please replace the paragraph beginning at page 11, line 9, with the following rewritten paragraph:

-- In the preferred embodiment, a 40 nm FSR is selected. This enables simultaneous scans of the C and L-bands, in addition to calibration relative to the reference band. Generally, to enable simultaneous scanning, the FSR of the filter must be greater than the bandwidth of at least one of the bands of interest so that successive modes of the filter can access both bands simultaneously. The FSR, however, must be less than the combined bandwidth of the bands, again to enable simultaneous access. Generally, the FSR is determined by the length l of the Fabry-Perot cavity in the filter, $FSR=2l/c$.--